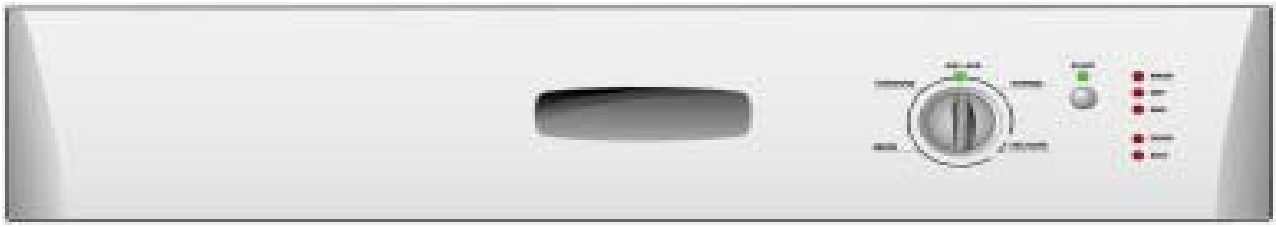
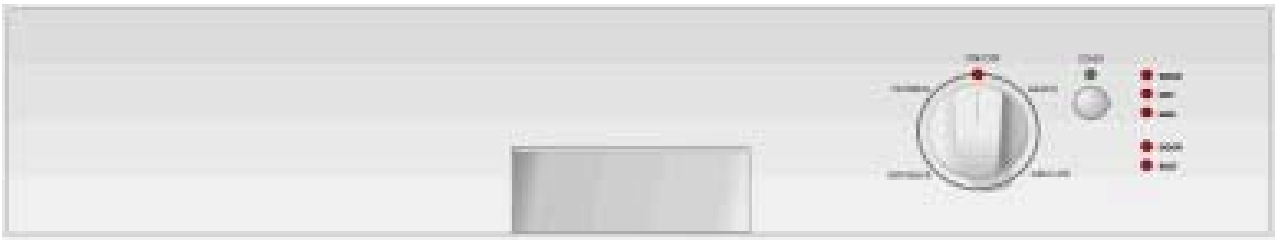
Electrolux
Distriparts

SERVICE MANUAL

DISHWASHERS





Dishwasher with electronic control
EDW 500
(Functionalities)

"DIVA" 45-60 cm

"free-standing"
and
"partially integrated"
(PNC 911xx9...)

Production:
ZM - Solaro (IT)

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1 Purpose of this manual

The purpose of this manual is to provide service personnel (who already have the basic knowledge necessary for repairing dishwashers) with information on dishwashers equipped with the EDW500 electronic control system, which are produced in the Solaro (MI - Italy) factory.

The EDW1500 control system consists of a main circuit board and a control/display board. Both boards are housed in a single plastic container, with integrated selector. It is used in some “DIVA” models.

This Manual describes:

- General characteristics
- Control panel and programmes
- Technical characteristics
- Guide to diagnostics

*For more detailed information regarding the hydraulic circuits and the structural characteristics of the appliances, refer to the Service Manual for presentation of the “DIVA” structure (publication number **599 35 55–25 and 599 36 09-90**).*

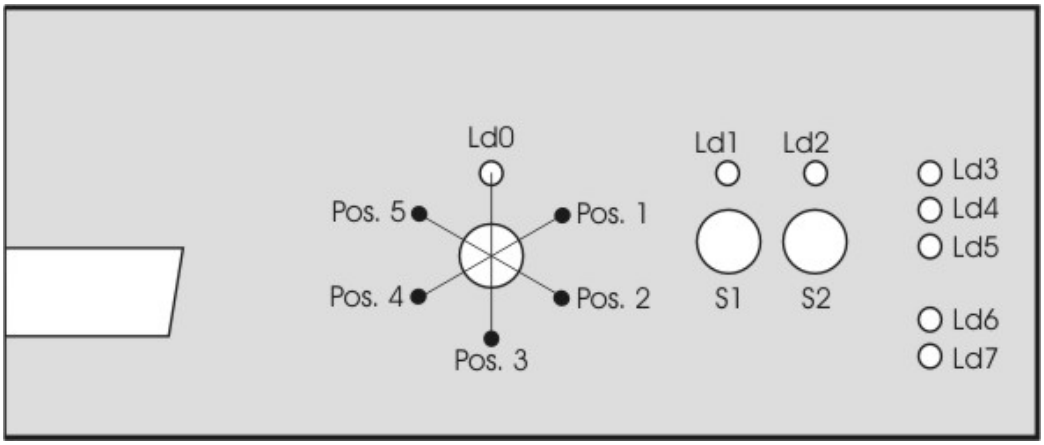
2 PRECAUTIONS

- **Electrical appliances must be serviced only by qualified Service Engineers.**
- **Always remove the plug from the power socket before touching internal components.**

3 GENERAL CHARACTERISTICS

Power supply	⇒	230 V / 50 Hz (limits 187÷254 V)
Total power absorption	⇒	2200 W (Resistance 2000W)
Mains water supply	⇒	Pressure Min. / Max. 5 ÷ 80 N/cm²
Capacity	⇒	9/12 place settings (45/60 cm)
Consumption (prog. BIO):		
Water	⇒	Lt. 14
Energy	⇒	KWh 0,8
Duration of cycle	⇒	170’
Controls		
- ON/OFF	⇒	On/Off function integrated to selector
- Programme start	⇒	By button Start/Reset
- Programme selection	⇒	By knob (n°3÷5 programmes)
- Option selection	⇒	By 1 button
- Display	⇒	Leds (On/Off, Start, cycle phases and alarms)
Washing system	⇒	Continuous (2600-2800 rpm)
Water fill level control	⇒	Pressure switch + Software
Water heating	⇒	Heating element enclosed in tube (2100 W)
Temperature control	⇒	NTC Temperature sensor
Drying systems	⇒	Activ
Safety systems / Alarms	⇒	Total protection (hydraulic + Software)

4 CONTROL PANEL



The configuration of the control panel depends on the following:

- styling
- number of buttons from a minimum of 1 (only Start/Reset) to a maximum of 2
- number of LEDs

[S1] - Start button
[S2] - OPTION SELECTION button
[LD0 - On/Off LED
[LD1]- Start LED
[LD2]- LED “OPTION” activated
[LD3] … ⇨ [LD5] - LEDs “CYCLE PHASES”
[LD6] [LD7] - LEDs “SALT / RINSE-AID”

4.1 Start/Reset (S1) button

All models feature this button and it is used to start or interrupt a washing cycle; if it is activated during a cycle it does not cause the cancellation of the current programme. It is used to enter the diagnostics mode.

4.2 Option (S2) button

The system used for selecting the wash programmes depends on the configuration of the model:

- *Delayed start*
- *Half load*

The functions of the various buttons and LEDs depend exclusively on the software configuration of each appliance; for detailed information please refer to the programme table of the specific model.

5 WASHING PROGRAMMES

The number and types of wash programmes and options vary with the configuration of the model (max. 5):

Type	Programme	Prewash (°C)	Wash (°C)	No. of rinses	Option ½ load	Min. ~
I2	**Intensive**	55	68	3	⊗	120’
N5	**Normal 3 rinses**	Cold	68	3	⊗	102’
E1	**Energy label xxx**	Cold	62 max	2	⊗	162’
Q4	**Soak**	Cold	--	--	--	12’
Q5	**Short 30 min**	--	65 max	1	--	31’

NB: If during the programme, the knob is turned to any position, but not the “0”, it continues without any modification.

5.1 Options

5.1.1 "1/2 load"

The 1/2 load option optimizes the washing cycle when only a small load is placed in the appliance.
When this button is pressed, certain parameters of the selected washing cycle are modified:

- Exclusion of Pre-wash (if featured)
- Reduction of the washing temperature
- Reduction of the duration of the programme

5.1.2 Delayed start

This option enables the user to set a fixed start delay of the washing cycle.

to select the delayed-start time:

1. Select the desired programme by rotating the knob: LED **LD0** lights up
2. Press the relative button to select the delayed-start time: the LED **LD2** lights up to show that the selection has been made.
   - The time reset when the relative button is pressed again: the LED **LD2** switches off.
3. Pressing button **S1** (Start), when the door is closed, the countdown starts.
4. When the countdown terminates, the selected cycle starts.

5.2 Cancelling a programme

5.2.1 Reset

To cancel a programme that has already started:

1. Press button **S1** (Start) for at least 3 seconds
2. LED **LD1** flashes
3. Salt/Rinse-aid LEDs light up: the programme is cancelled and the appliance returns to preselection mode.
4. Select the new programme.

5.2.2 Interruption of a programme (pause)

- If the knob is turned to position "**0**", the washing programme interrupts.
  - Turning the knob to the position corresponding to the programme in progress or to any other position, the appliance switches on again and the programme previously chosen starts from the point at which it was interrupted.
- If the door is opened, the appliance remains on (the power loads are deactivated).
  - The Option LED remains on.
  - Closing the door the programme starts, after a brief delay, from the point at which it was interrupted.

Important! If the appliance is switched off or if the door is opened for more than 30 seconds during the drying phase, the cycle is considered to have been terminated after the regeneration phase; when the appliance is switched on again, it returns to programme selection mode.

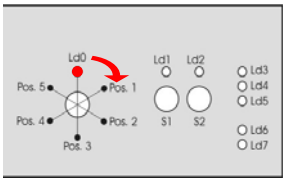
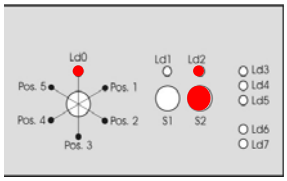
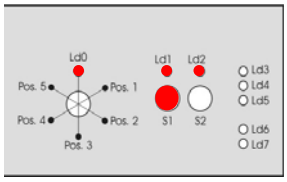
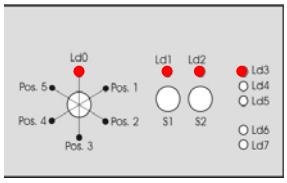
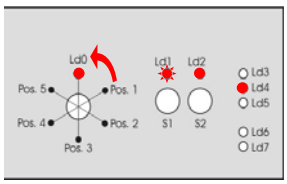
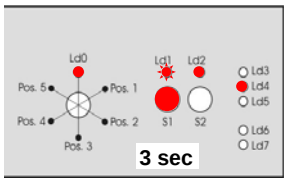
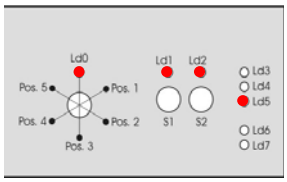
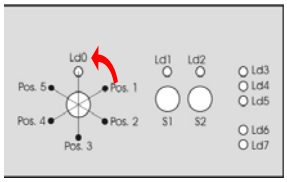
5.3 Power failure

The Power Failure function maintains the information relative to the cycle status even in the even of a power outage; when the power supply is restored, the cycle resumes from the point at which it was interrupted.
If the power failure occurs during the drying phase, the cycle is considered to have been terminated after the regeneration phase.

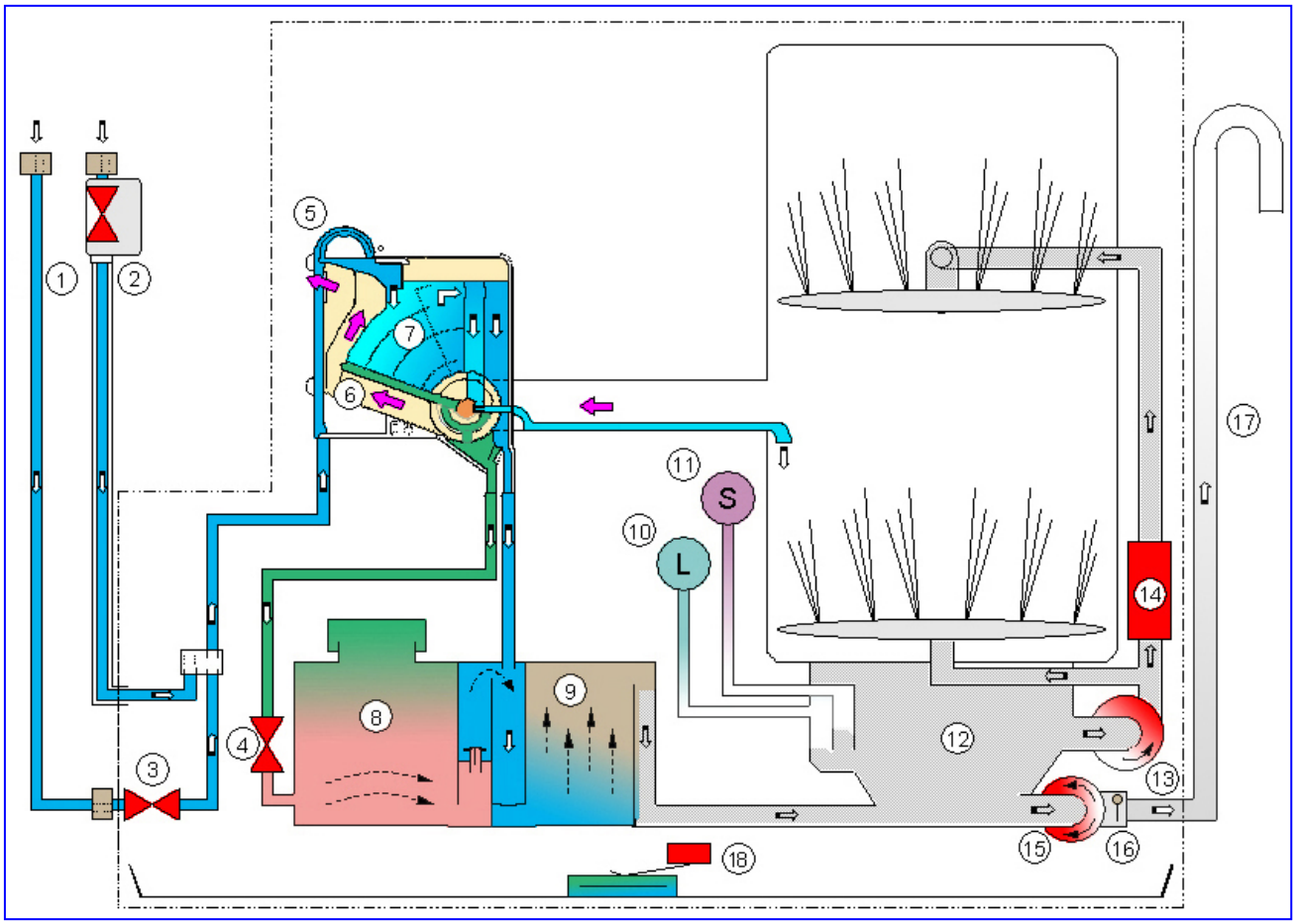
The Power Failure has been defined in the following way:

- When a Power Fail occurs, all loads switch off simultaneously to enable to save the data in EEPROM, through the energy stored in the supply condenser of the control board, and when the power is restored, the cycle restarts from the point at which it was interrupted.

6 SEQUENCE OF OPERATION

SELECTING THE CYCLE	1. Turn the knob to select the desired programme. ↳ The **LD0** placed above the knob lights up.	
	2. Select the delayed start or the desired option (if featured). ↳ The relative LED lights up.	
START	3. Close the door. 4. Press button **S1** to start the washing. ↳ The LED LD1 lights up. ↳ Before starting the programme, it is possible to modify the selections.	
EXECUTION OF CYCLE	5. During the cycle, the LEDs relative to the current phase and to the selected option are lit. 6. Turning the knob to any position, but not "**0**", the programme continues without any modification.	
	7. To interrupt a programme in progress: ↳ Open the door carefully or turn the knob to position "**0**". ↳ To restart the cycle, turn the knob to the position corresponding to the cycle previously chosen or to any other position and close the door.	
	8. To cancel a programme in progress: ↳ Press button Start **S1** for about 3 seconds. ↳ The LED **LD1** flashes. ↳ The Salt/Rinse-aid LEDs light up.	
EDN	9. At the end of the programme: ↳ The END of CYLE LED **LD5** lights up. ↳ Opening and closing the door, the LED switches off.	
	10. Turn the knob to OFF position to switch the appliance off.	

7 HYDRAULIC CIRCUIT



KEY

1 - Fill hose	10 - Level pressure switch
2 - Fill hose with Acquacontrol	11 - Anti-overflow pressure switch
3 - Fill solenoid	12 - Sump assembly
4 - Regeneration solenoid	13 - Wash pump
5 - Air-Break	14 - Tube-enclosed heating element
6 - Steam condenser	15 - Drain pump
7 - Regeneration chamber	16 - Non-return valve
8 - Salt Reservoir	17 - Drain hose
9 - Resin Reservoir	18 - Anti-flooding device

8 ELECTRICAL COMPONENTS AND FUNCTIONS

8.1 EDW500 Electronic control system

The EDW500 control system consists of a main circuit board and a control/display board. Both boards are housed in a plastic container (fig. 1). The programme selector is housed in the electronic board; the On/Off function is performed by the selector.

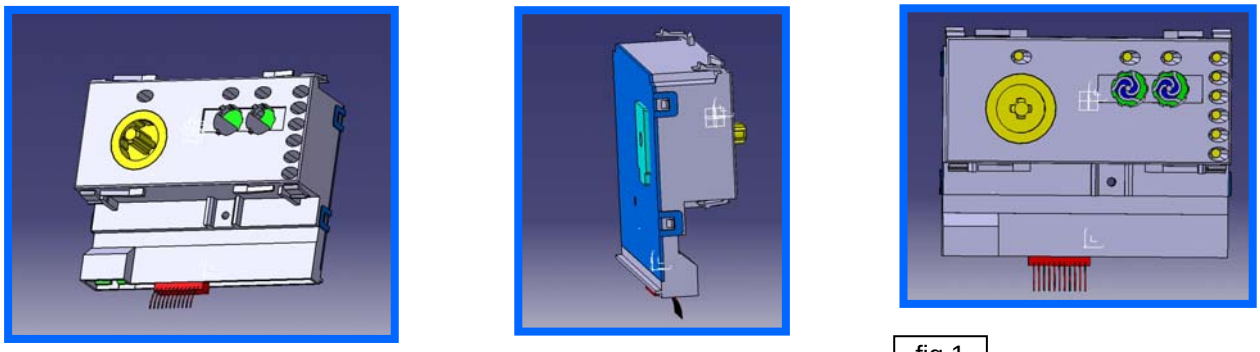
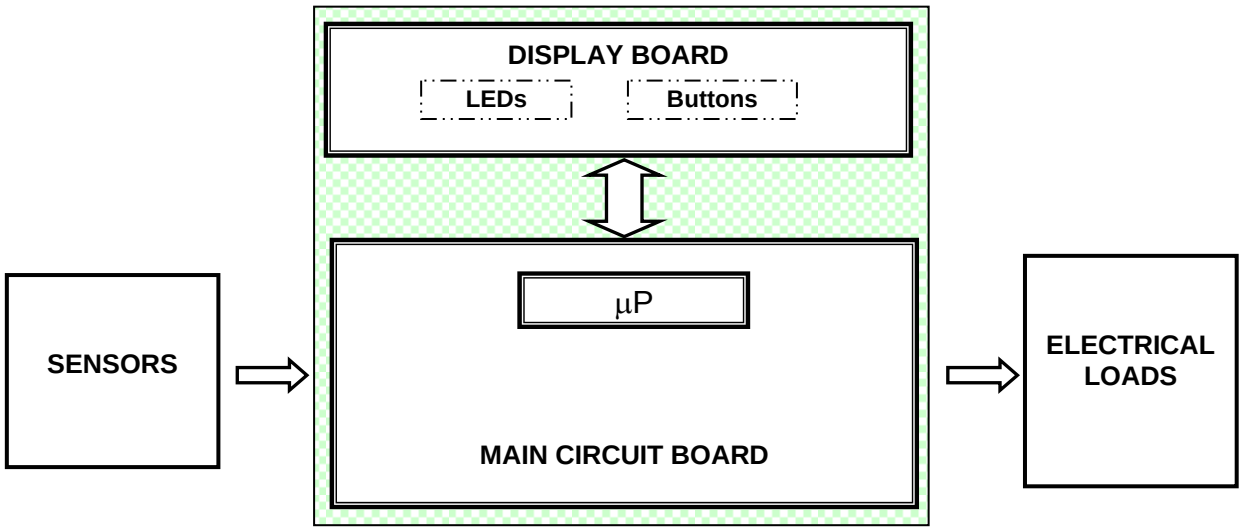


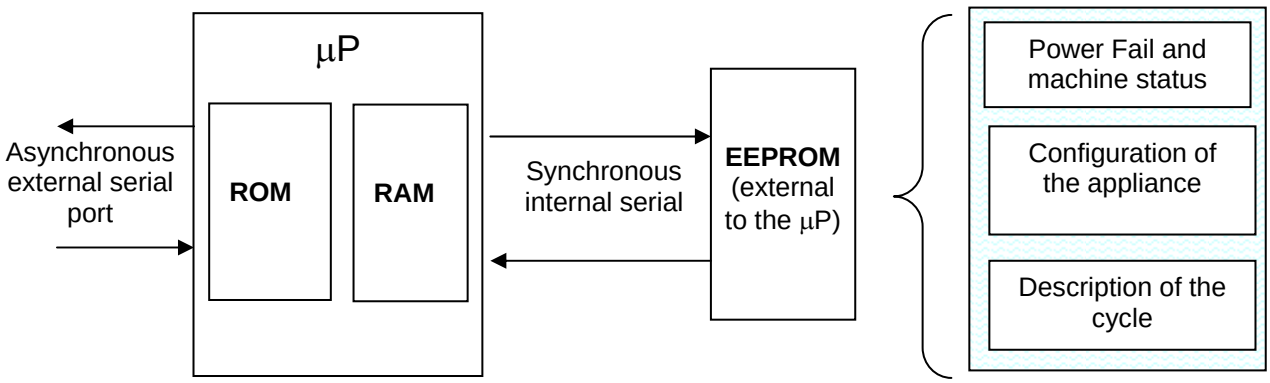
fig.1

8.1.1 Functions of the circuit board



- ⇨ The circuit board receives signals relative to the cycle settings via the control/display board. The buttons and LEDs are also mounted on this board.
- ⇨ The board also powers all the electrical components (solenoid valves, washing pump, detergent/rinse-aid dispenser, drain pump, heating element)
- ⇨ The board controls the temperature of the washing water via an NTC sensor
- ⇨ The circuit board monitors the status of the pressure switch and the rinse-aid/salt sensors.

8.1.2 Memory in the control system



The main circuit board features an EEPROM memory (external to the microprocessor) which stores in memory data relative to the configuration, description of the cycle, cycle status in case of a power failure, and any alarm conditions.

The configuration data (entered in the factory using a computer with a DAAS interface) determine the functionalities of the appliance (number and type of programmes, options, LEDs etc).

8.2 Specifications for actuators and sensors

8.2.1 Components

TYPE OF COMPONENT	POWER AVAILABLE	TYPE OF ELECTRONIC CONTROL
Wash pump	Max 250W	Triac
Drain pump	Max 100W	Triac
Heating element	Max 2100W	Relay
Water fill solenoid	Max 10W	Triac
Regeneration solenoid	Max 10W	Triac
Detergent and Rinse-aid solenoid	Max 10W	Triac

8.2.2 Sensors

TYPE OF SENSOR	TYPE OF ELECTRONIC SIGNAL	TYPE OF COMPONENT
Salt sensor	Digital 5 Volt	Reed
Rinse-aid sensor	Digital 5 Volt	Reed
Temperature sensor	Analogue 5 Volt	NTC *
Level sensor	Digital - High voltage	Pressure switch
Door closure sensor	Digital - High voltage	Switch
Anti-flooding sensor	Digital - High voltage	Switch

*** NTC Temperature sensor**

* **NTC** COMPARATIVE VALUES		
Temperature °C	⇨	**Nominal value Ω**
10	⇨	9655
25	⇨	4850
60	⇨	1205
90	⇨	445

8.3 Power supply and programme selection

The main board is powered by the closure of contacts. The connectors used are B2 (neutral) and B1 (line).

The control/display board (user interface) is powered at 220V by the main board.

When the door is closed, the main board detects the closure of the contacts of the switch (IP) across connectors C1-C3 and starts the washing programme.

When the door is opened, the power loads are disconnected from the power supply and the cycle is paused.

8.4 Fill circuit

8.4.1 Level and anti-overflow pressure switch

- The level of water introduced into the appliance is determined by the level pressure switch.
- The anti-overflow pressure switch ensures that the level of water does not exceed the safety threshold (causing overflow from the door).

8.4.2 Fill system

The water fill solenoid valve is powered by the electronic board via the connector D7, by the door switch (IP) and the anti-flooding microswitch (DA).

The level of water in the sump is monitored by the pressure switch (RL). The electronic board constantly monitors the status of the pressure switch via a “sensing” line connected to connector D5:

⇨ EMPTY if the contacts are closed on 1-2

⇨ FULL if the contacts are closed on 1-3

8.4.3 Anti-flooding device

Intervention of the anti-flooding device causes the contacts of the microswitch (DA) to open, thus disconnecting the solenoid valve from the power supply.

8.4.4 Intervention of the anti-overflow system

If the anti-overflow pressure switch (PA) should intervene, the closure of the contact on FULL (1-3) powers the drain pump (PS). The pump remains in operation until the contact returns to EMPTY (1-2).

	If the door is opened or the appliance is switched off, the drain pump is deactivated.

8.5 Control of water fill phase

The quantity of water necessary to carry out the washing cycle is determined exclusively by the closure of the electrical contact of the pressure switch, which changes from EMPTY to FULL. This system ensures that, if the pressure switch re-opens on EMPTY, further water is introduced until it returns to FULL. The water fill phase consists of the following sub-phases:

8.5.1 Static fill

With the motor switched off, the fill solenoid valve is energized and water is introduced into the appliance until the pressure switch signal switches to FULL.

8.5.2 Dynamic fill

The dynamic fill is obtained by switching on the washing pump whose rotation causes the pressure switch to switch to EMPTY. Subsequently, the fill solenoid valve is energized and water is introduced until the switch returns to FULL.

The speed of rotation of the motor determines the quantity of water introduced, since the electronic control system switches on the washing pump at a rotation speed of **2600-2800 rpm**.

8.5.3 Level stability control

The hydraulic circuit operates with maximum efficiency when the pressure switch signal remains stable on FULL. In practise, the quantity of water circulating in the sump allows the motor to run without speed fluctuations caused by cavitation.

When the pressure switch signals FULL, the fill solenoid valve switches off.

8.6 Water fill time

The opening of the solenoid valve has a pre-set overall duration, which is subdivided into the various sub-phases of the fill:

8.6.1 Static fill time

T.S. = max 90 seconds: This is the maximum time within which the pressure switch must switch to FULL. If the FULL signal is not received from the pressure switch within this time, the electronic control system interrupts the washing cycle and the appliance enters alarm condition [**1 0**].

8.6.2 Dynamic fill time

T.D. = T.S. x 3: This is the maximum time allowed for the entire fill phase within which the pressure switch signal must stabilize on FULL.

- If the pressure switch signal does not stabilize on FULL within this period (T.S. x **3**), the electronic control system switches off the fill solenoid (and the heating element, if switched on), and then allows the washing cycle to proceed until it is completed. In this situation, the alarm condition [**F 0**] is not displayed to the user, but may be accessed by the Service Engineer using a specific procedure.
- If, during a 2600 rpm dynamic fill, the pressure switch never closes on FULL during the initial 60 seconds, the electronic control system interrupts the washing cycle and the appliance enters alarm condition [**1 0**].

8.6.3 Power supply interruption during water fill

If the water fill phase is interrupted by opening the door or due to a power failure, the contents of the counters are stored in memory; when the door is re-closed or when the power supply is restored, the water fill resumes from the point at which it was interrupted; the new counter values are added to those previously memorized.

8.7 Level stability during washing

Once the fill phase has been completed, the cycle proceeds to the washing phase. The washing phase is carried out using cold or heated water, and the status of the pressure switch is monitored constantly to ensure that the hydraulic system functions correctly. Water replenishment cycles may be performed if necessary.

If the pressure switch returns to EMPTY during the washing phase, the fill solenoid is energized for a maximum time equivalent to **T.S. x 3** (maximum allowable total fill time).

If this time is exceeded, the washing cycle is completed, but no further supplementary fills are performed. In this situation, alarm condition [**F 0**] is stored in memory. This alarm code is not displayed to the user, but can be accessed by the Service Engineer using a specific procedure.

8.8 Washing system

The appliance features the classic washing system in which the mechanical washing action is obtained by the rotation of the washing pump which, by ducting water into the hydraulic circuit, actions the two spray arms simultaneously.

The washing pump is actioned by an asynchronous motor with a start-up capacitor (3µF– 450VL). The washing pump rotates in a counter-clockwise direction (seen from the impeller side).

8.8.1 Control of the washing pump

The washing pump (PL) is powered by the electronic control (connector D3-D11).

8.9 Heating

The heating element is enclosed in a protective tube, and is used to heat the washing water (but does not switch on during the drying phase). The heating element is fitted to the outlet of the washing pump and connected to the duct which feeds the upper spray arm.

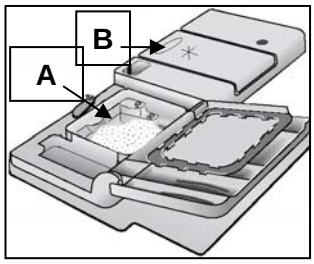
The heating element (RR) is powered by electronic control (connector A1) and by the level pressure switch (RL), which must be set to “FULL” (contact closed on 1-3).

Two safety thermostats are fitted to the heating element:

- an automatic-reset thermostat which intervenes at 98ºC
- a thermostat with a thermal fuse (206ºC)

The temperature of the water is controlled by the main circuit board via an NTC sensor (ST) which is connected to connectors H1-H3.

8.10 Integrated detergent dispenser



The detergent dispenser is a plastic container consisting of two separate sections. The first (**A**) contains the detergent; the second (**B**) contains the Rinse-aid.

The dispenser is of the single-coil type, and uses a single electrical coil, connected to a mechanical system, for both functions.

When the coil is energized, it actions the mechanism via a series of levers to introduce detergent in a determined sequence (first detergent, then rinse-aid).

The coil of the detergent dispenser (DD) is powered by an electronic control via connectors E1-E3 at certain points during the cycle, thus ensuring correct dosage.

Some models feature a rinse-aid sensor whose reed contact (SB) is connected to connectors G3-G4 on the circuit board.

The absence of rinse-aid causes the contact to close, which lights the corresponding LED (on the display board).

8.11 Drain

The drain pump (PS) is powered by connectors C1-D1 and via the contacts of the switch door (IP).

At the end of the drain phase, a control procedure is performed to check that the contact of the level pressure switch is open on EMPTY. If this is the case, the appliance proceeds to the subsequent phase.

If, as a result of a problem in the drain phase, the pressure switch contact remains closed on FULL (i.e. if there is water in the hydraulic circuit), the drain phase is repeated.

On completion of this second drain phase, the status of the pressure switch is again checked. If it is still closed on FULL, alarm [i20] is generated (failure to drain). The time-out for each of these two phases is 120 seconds.

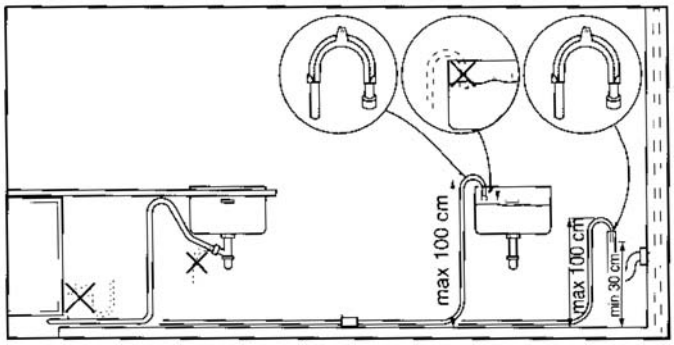
N.B. The washing programmes always begin with a drain phase.

8.11.1 "Siphon" effect

If the drain tube is incorrectly positioned, the so-called "siphon effect" may occur, in which case an alarm is displayed ***iF0 (see 9.1).***

The problem is particularly likely to occur during execution of the "declaration cycle": although the drain pump shuts down at the end of the (partial) drain phase, water continues to be expelled from the machine because the drain tube is incorrectly positioned. When this occurs, water loaded by the fill solenoid during the next phase is directly expelled, so the "full contact" on the pressure switch does not close before its "time out".

Thus, if alarm ***iF0*** occurs, it is a good idea to make sure the drain tube is correctly positioned as shown in the instruction manual.



8.12 Regeneration system

Regeneration of the water softening system, which takes around **4** min, is usually performed at the start of the drying phase.

Every time regeneration is performed (with activation of regeneration solenoid **4**), the accumulation chamber is completely emptied of its contents (about 230 cc of water). Regeneration is controlled by the electronic control system "Ad Hoc", i.e. not at each washing cycle, but rather at intervals determined by the level of regeneration selected:

- If level [**1**] is selected, regeneration is never performed and the SALT LED (if featured) always remains unlit.
- If level [**10**] is selected, regeneration is performed twice during each cycle; first at the end of the washing phase, and then at the beginning of the drying phase.

The regeneration solenoid (ER) is powered by connectors D9-C1 on the main board and by the contacts of the door switch (IP).

Some models may feature a salt sensor, whose Reed contact (SS) is connected to G1-G2 connectors of the board.

When there is no salt, the contact closes and the relative LED lights up (on display board).

8.13 Resin washing

Washing of the resins contained in the softening system is performed at the beginning of each washing cycle. In practise, the solution of salty water (regeneration water) remains deposited in the resin container from the end of the last completed cycle until the subsequent cycle.
If the regeneration level is set to [**10**], washing of the resins is performed once at the beginning of the washing cycle and then again immediately after the regeneration process performed at the end of the washing phase:
The regeneration sequence is as follows

a. Drain (30 seconds)
b. Water fill to correct level
c. Drain (10 seconds)
d. Water fill (15 seconds)
e. Complete drain

8.14 “Blending” function

This function is performed inside the fill tank during the water fill phase which, depending on the position of the selector, automatically blends the softened water with the unsoftened water present in the appliance.

In practice, the softened water is introduced into the appliance through the softening system, while the unsoftened water flows via an open by-pass duct directly through the steam venting ring.

If the level of regeneration is set to between **1** and **4**, it is advisable to activate the BLENDING function to mix softened water with unsoftened water.
This function optimizes the consumption of salt thus preventing the possibility of corrosion of glass recipients due to excessively soft water.

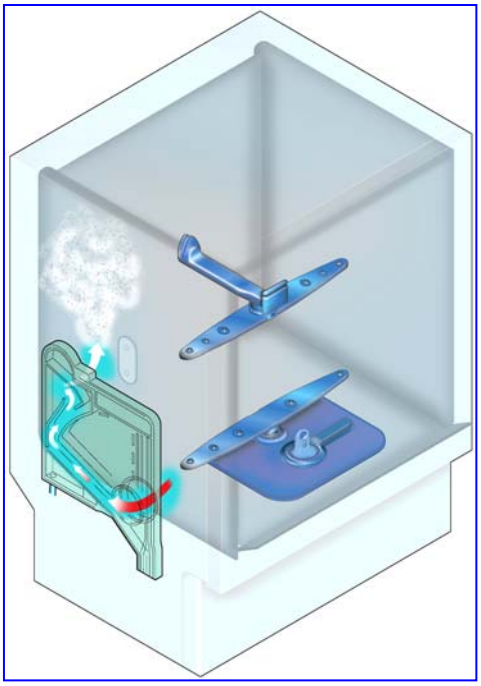
When the BLENDING function is activated, the percentage of unsoftened water introduced into the dishwasher is **15%.**

The BLENDING function is activated using the selector knob located inside the tub, on the left side, in the vicinity of the steam venting grille:

Position of selector

- ⇨ pos. **1** = blending enabled.
- ⇨ pos. **2** = blending disabled.

9 DRYING



In these dishwashers, the dishes are dried by means of a steam condensation process. The drying system is based on the circulation of the hot air produced during the hot rinse, in which the steam circulates inside the condenser of the fill tank.

The steam (humid hot air) produced during the hot rinse, enters from below through the steam venting grille and circulates slowly inside the chamber of the fill tank where it condensates and then exits through the upper part.

10 ALARMS

When an abnormal situation occurs that may interfere with machine functioning, the main board activates a safety system which in most cases interrupts the washing cycle. The last three alarm situations are stored in memory. Using a special procedure, service personnel can display all the alarms stored in memory. The user is only shown four of the alarms in progress.
The END OF CYCLE LED flashes repeatedly.

10.1 Table of alarm codes

Type of Alarm	No. flashes of end-of-cycle LED	Displayed to the user	Description of the alarm condition	Machine status	Possible causes
i10	**1**	yes	**Water fill time-out** (The pressure switch does not close on FULL after 90 sec. static fill, or never closes on "FULL" during the initial 60 sec of the dynamic fill at 2800 rpm)	The drain pump switches on, then the cycle stops	Tap closed; water mains pressure too low; fill solenoid / wiring faulty; hydraulic circuit of pressure switch obstructed; level pressure switch / wiring faulty; circuit board faulty (solenoid triac short-circuited)
i20	**2**	yes	**Water drain time-out** (The pressure switch does not return to EMPTY after two drain phases lasting 120 seconds)	The drain pump switches on, then the cycle stops	Drain circuit obstructed/blocked; drain pump interrupted or jammed (foreign bodies); level pressure switch blocked on FULL (1-3); hydraulic circuit of pressure switch obstructed; wiring faulty; circuit board faulty
i30	**3**	yes	**Intervention of Anti-flooding system** (the drain pump switches on)	The cycle is interrupted and the drain pump switches on	Water leakage from the tub - sump and various connections (pump, upper spray arm duct etc.). Floating sensor blocked mechanically. Microswitch faulty. Fill solenoid blocked mechanically. Circuit board faulty (solenoid triac short-circuited). Wiring faulty.
i50	**5**	yes	**Motor triac short-circuited** (the washing pump runs uncontrolled at maximum speed)	Water fill to level (if necessary), deactivation of the other actuators, cycle interrupted. The washing motor runs at maximum speed and the alarm is displayed.	Circuit board faulty

Type of alarm	No. flashes of end-of-cycle LED and “beeps”	Displayed to the user	Description of the alarm condition	Machine status	Possible causes
i60	**6**	no	**Heating Time-out** (the check takes place every 3 minutes: the temperature must increase by a certain amount at each step)	The programme continues to the end without heating (the washing result will probably be unsatisfactory)	Heating element faulty; intervention of safety thermostats (open); wiring faulty; NTC sensor (poor thermal contact); insufficient water circulating in the tub; washing pump faulty (impeller stripped); circuit board faulty.
i70	**7**	no	**NTC sensor short-circuited or open**	The programme continues to the end without heating (the washing result will probably be unsatisfactory)	NTC sensor faulty; wiring short-circuited / open; circuit board faulty.
i80	**8**	no	**Communication error between the microprocessor and the EEPROM**	Machine inoperative: no selection possible **(*)**	Circuit board faulty.
i90	**9**	no	**Problems with software configuration**	The fault occurs when switching on: no selection possible **(*)**	Circuit board faulty (configuration software incorrect).
ib0	**11**	no	**Problems with the turbidity meter** [if featured] (Calibration Time-out)	The programme continues as if a “heavy soiling” condition had been detected.	Turbidity sensor faulty; sensor wiring faulty; circuit board faulty.
id0	**13**	no	**Problems with the washing motor: no signal from the tachometric generator** (washing pump powered, but no signal from the generator)	The heating element is switched off. If the fault persists after the Time-out, the washing pump operates at maximum speed and the alarm code is stored in memory (the cycle continues)	Motor winding interrupted / short-circuited; motor jammed (foreign bodies); wiring to washing motor faulty; motor capacitor faulty; Tachometric generator interrupted / short-circuited; circuit board faulty.
iF0	**15**	no	**Water replenishment Time-out** (3 times during the T.S. Time-out)	The cycle continues until the next phase without supplementary fills and without heating. The error is cancelled on completion of a drain phase.	Dishes upside-down; central filter clogged; excessive foam; leaks from the sump-pressure switch coupling; pressure switch faulty / false contacts.

(*) If it is not possible to access diagnostics mode, switch the appliance off and then on again to check that this is not caused by a temporary fault. Before replacing the circuit board, check that it is correctly powered by controlling the following

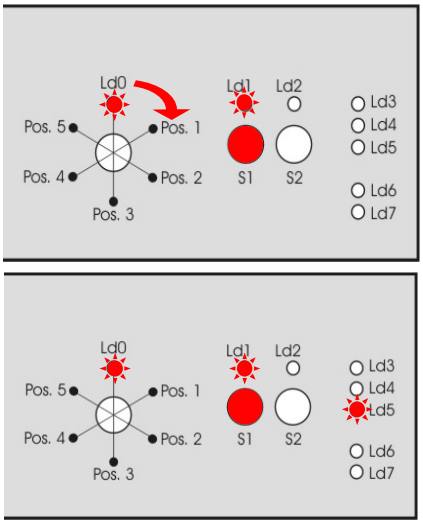
- Continuity of the power cable
- Correct operation of the suppressor
- Closure of the door switch contacts
- Continuity of the wiring between connectors on the circuit board and the suppressor.

11 USER MODE

With this procedure it is possible to:

- Modify the regeneration level selection (depending on the water hardness).
- Activate or deactivate the rinse-aid supply.

11.1 Regeneration selection



To activate the function:

1. Press and hold down button **S1**.
2. Turn the knob to **Position 1**:
   - The LEDs LD0 and LD1 flash
   - Release button **S1**
3. Press button **S1**
   - The regeneration level is displayed by the **End of cycle** LED which flashes and pauses at intervals: for the decodification, see summary table of alarms.

Press button **S1** to increase the regeneration level according to the following values:

Level	No. of flashes of "End of cycle" LED	Water fill between regeneration procedures	Time regeneration solenoid opens	Position of tank selector	Hardness of water treated	
	nº	Litres	sec	nº	º F (TH)	º D (dH)
1	1	- - -	0	1	0 > 7	0 > 4
2	2	130	240	1	8 > 18	4 > 10
3	3	94	240	1	19 > 25	11 > 14
4	4	70	240	1	26 > 32	15 > 18
*** 5**	5	53	240	2	33 > 39	19 > 22
6	6	37	240	2	40 > 50	23 > 28
7	7	20	240	2	51 > 64	29 > 36
8	8	15	240	2	65 > 75	37 > 42
9	9	10	240	2	76 > 90	43 > 50
10	10	3	2x240	2	91 > 125	51 > 70
*** "5" =** Level set by factory Position of tank selector: **"2"**						

12 SERVICE MODE

With this procedure it is possible to access the Service Diagnostics System. Once this mode is accessed, it is possible to:

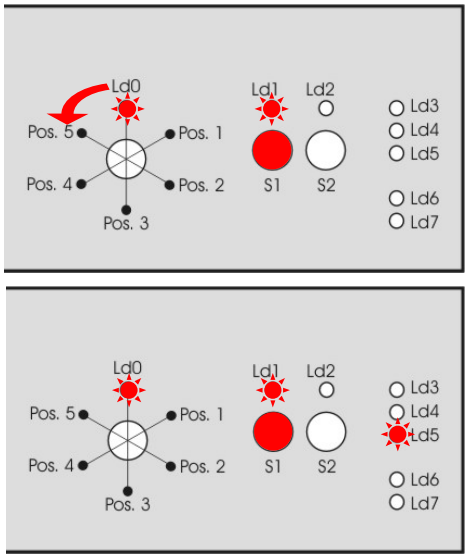
- read and cancel the alarms
- control the operation of the various components of the appliance
- start the Service diagnostics mode

12.1 Reading the alarms and activating the individual components

To activate the function:

1) Press and hold down the button **S1.** T
2) Turn the knob anti-clockwise till **Position 5**:
   - ↳ The LEDs LD0 and LD1 flash.
   - ↳ Release button **S1**.
   - ↳ Press button **S1**.
   - ↳ the first memorised alarm is displayed: the **End of cycle** LED flashes and pauses: for the decodification, please refer to table of alarm codes.
4) Press again button **S1** to display the second alarm.
5) Pressing button **S1** again, the third alarm is displayed.
6) Pressing button **S1** for the fourth time, the appliance actuators are activated:
   - ↳ 4th actuation: regeneration solenoid
   - ↳ 5th actuation: drain pump
   - ↳ 6th actuation: water fill solenoid (water up to level)
   - ↳ 7th actuation: heating (only if water up to level)
   - ↳ 8th actuation: washing pump
   - ↳ 9th actuation: detergent/rinse-aid dispenser
   - ↳ 10th actuation: drying fan
   - ↳ 11th actuation: it starts again from the first alarm

All positions can be repeated pushing button S1 sequentially.



⚠	*The components are powered with door closed.* *If button S1 is not pressed for 60 seconds, the diagnostics terminate automatically.*

12.2 Cancelling alarm codes from memory / test of LEDs

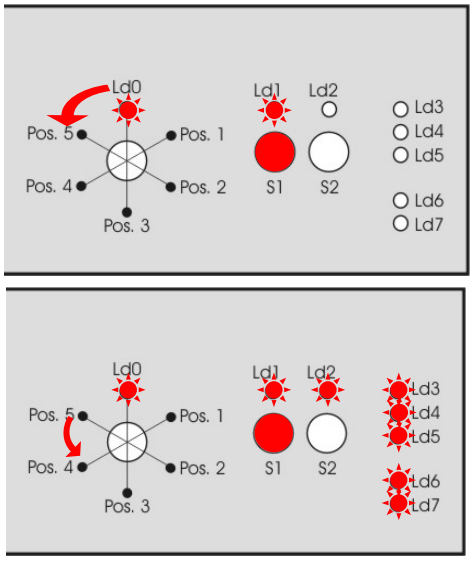
It is good practise to cancel the alarm memorised:

- after reading the alarm code, to check whether it is repeated during the diagnostics test.
- after repairing the appliance, to check whether it is repeated during the testing cycle.

To activate the function:

1) Press and hold down button **S1.**
2) Turn the knob anti-clockwise till **Position 5**:
   - ↳ the LEDs LD0 and LD1 flash.
   - ↳ release button **S1**.

3) Turn the knob till **Position 4.**
   - ↳ press button S1.
   - ↳ all LEDs start to flash for 30 seconds.



12.3 Functional testing cycle

This is an abbreviated washing programme (50 min) which allows the Service Engineer to test all the functions that comprise a traditional washing cycle; in effect, the system simulates a normal cycle.

12.3.1 Selecting the cycle

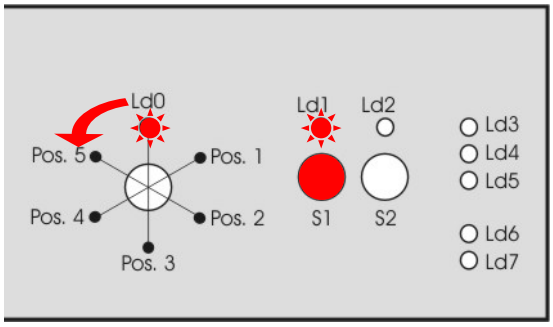
To activate the function:

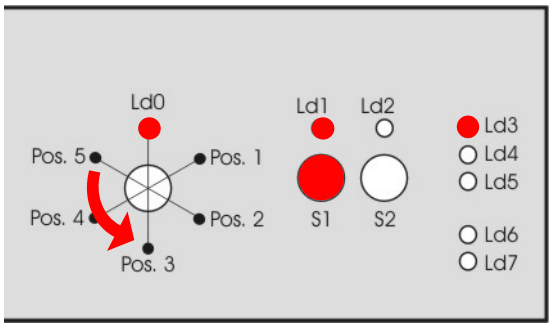
1. Press and hold down button **S1**.
2. turn the knob anti-clockwise till **Position 5**.

↳ the LEDs LD0 and LD1 flash.
↳ release button **S1**.

3. Turn the knob till **Position 3**

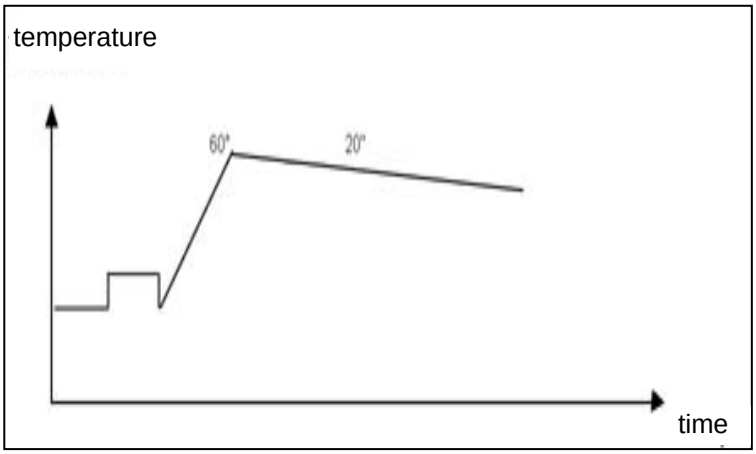
↳ press button **S1**.
↳ the programme starts: the programme behaves as in a normal cycle; the PAUSE and CANCEL options are accessible.





12.3.2 Cycle phases

Phase	Duration
Water fill, Turbo activation	30''
Continuous washing, dispenser opening	45''
Drain	dilution
Water fill	---
Continuous washing	60''
Drain	dilution
Water fill	---
Controlled washing 2600rpm, heating at 60°C	
Controlled washing 2600rpm, maintaining at 60°C	1200''



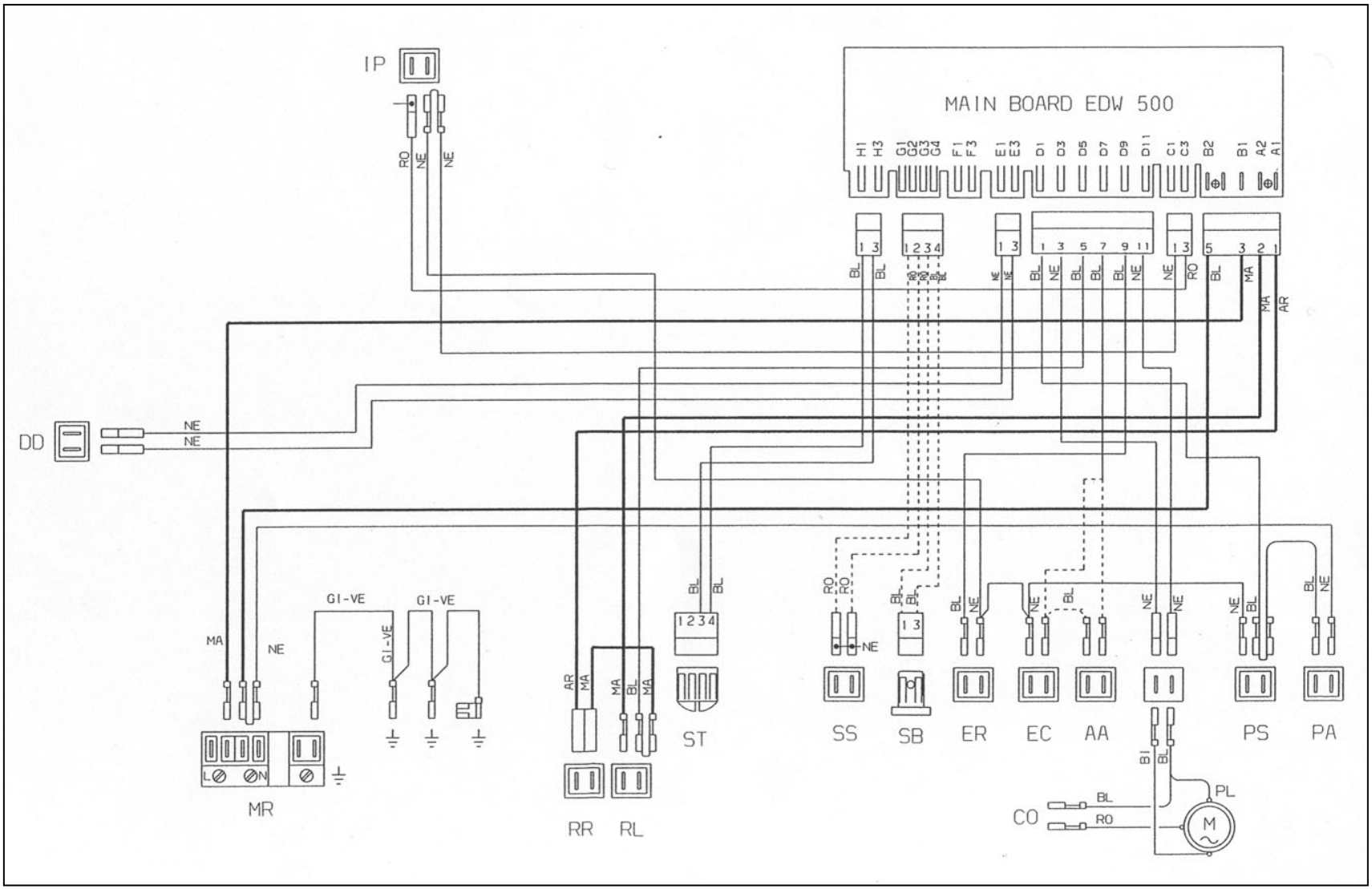
N.B.: *At the beginning of the subsequent programme (i.e. after the test cycle), the resins are washed. The overall duration of the test cycle is about 50 minutes.*

12.4 Exiting Service and User modes

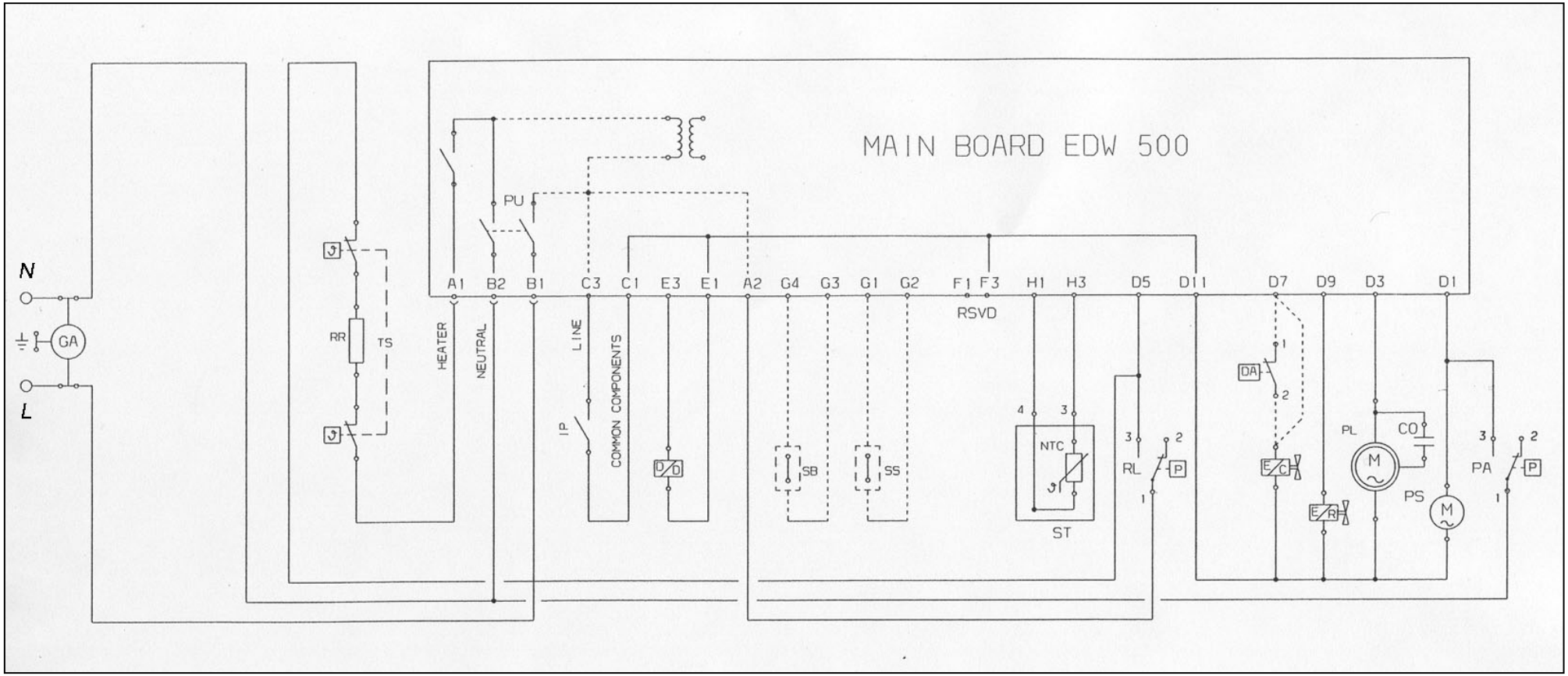
To exit these modes, turn the knob to OFF position and switch the appliance off or wait **60 seconds**: the LEDs light up and the appliance returns to selection mode.

13 ELECTRICAL FUNCTIONS

13.1 Electrical circuit diagram



13.2 Basic circuit diagram



13.2.1 Key to circuit diagram

AR = Orange BI = White BL = Blue CE = Light blue GI-VE = Yellow-Green MA = Brown	NE = Black RO = Pink VI = Lilac AA/DA = Anti-flooding device Beamer = Beamer	CO = Capacitor DD = Detergent/ Rinse-aid dispenser EC = Fill solenoid ER = Regeneration solenoid **GA** = Suppressor IP = Door switch	MR = General terminal block MV = Fan motor PL = Washing pump PS = Drain pump PU = Pushbutton array PR/RL = Level pressure switch	PA = Anti-overflow pressure switch RR = Heating element SB = Rinse-aid sensor SS = Salt sensor Turbidity = Turbidity sensor ST = Temperature sensor	TAC/T = Tachometric generator TS = Safety thermostat Main Board = Main board User Interface = Display board

14 TABLE OF PROGRAMMES

The table below lists the phases of the programmes for this type of appliance. As these can be configured differently, refer to the relative documentation for the specific cycles available for each model.

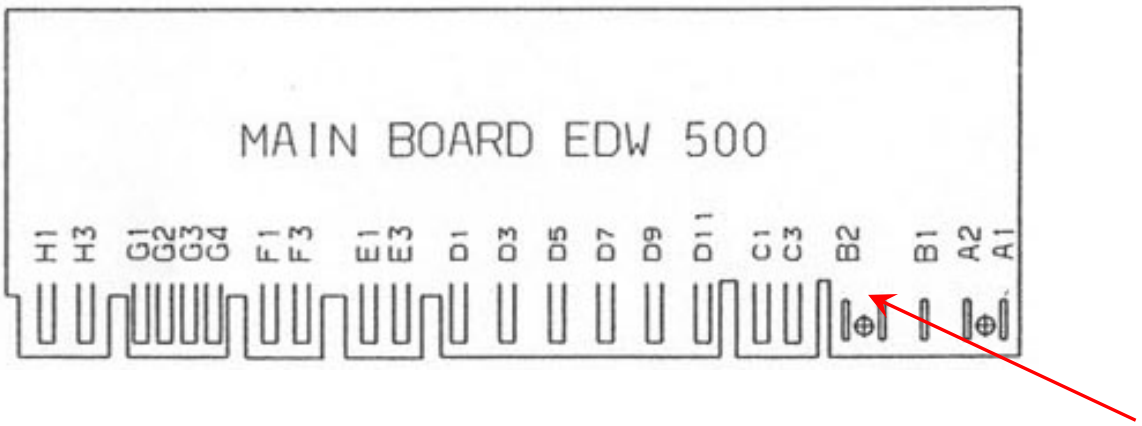
Programmes		Pre-wash			Wash					1st Cold Rinse			2nd Cold Rinse			Hot rinse			
Type	Programme	Heating (Temperature)	Wash time after heating (min.)	Type of wash	1st Heating (Temperature in °C)	Wash time after heating (min.)	2nd Heating (Temperature in °C)	Wash time after heating (min.)	Type of Wash	Wash time (minutes)	Wash time (minutes)	Type of Wash	Wash time (minutes)	Wash time (minutes)	Type of Wash	Heating (Temperature in °C)	Wash time after heating (min.)	Type of Wash	Cycle time (minutes)
I2	**Intensive (ctrl)**	55°C	10'	ctrl	55°C	5'	68°C	14'	ctrl	3' (<65°C)	3'	ctrl	3'	3'	ctrl	68°C	---	ctrl	120'
N5	**Normal 3 rinses**	---	6'	ctrl	50°C	4'	68°C	8'	ctrl	3' (<65°C)	3'	ctrl	3'	3'	ctrl	68°C	---	ctrl	102'
E1	**Energy label xxx**	---	10'	PW1	15,5' <62°C	42'	---	---	PW1	5'	---	PW1	---	---	---	16' <68°C	2'	PW1	162'
Q4	**Soak**	---	8'	PW1	---	---	---	---	---	---	---	---	---	---	---	---	---	---	12'
Q5	**Short 30 min.**	---	---	---	14,5' <65°C	---	---	---	ctrl	---	---	---	---	---	---	9' <67°C	---	ctrl	31'

***N.B.**: The overall times for the programmes (duration) are approximate, and do not take into consideration the extra rinse, which may be selected as an option. The various phases do not include the times for regeneration/washing of the resins which, being performed "Ad Hoc", are not carried out at every cycle.*

15 CHECKING THE EFFICIENCY OF THE COMPONENTS

In order to facilitate the control procedure for the components to be tested, a TEST PROCEDURE has been created which indicates the point to which the probes of the tester should be applied and the correct theoretical value for each component tested.

- Remove the door and detach all the connectors from the main board.
- Connect the probes of the tester to the appropriate points on the connector. Compare the ohmic reading with the theoretical value.



Care should be taken relative to the position of connector "**B1**" - "B**2**": if this connector is replaced in the incorrect position (back-to-front), the appliance will not function since the power supply will be disconnected.

15.1 Measurement points on the board wiring connectors

LIST OF COMPONENTS	PROBE CONTACTS	CORRECT VALUES		NOTES
(RR) - HEATING ELEMENT **+** (TS) - SAFETY THERMOSTAT	**A1 ⇔ D5**	⇨	**25 Ω** ± 8%	*connected in series (2100W)*
(PR) - LEVEL PRESSURE SWITCH	**A1 ⇔ A2**	⇨	**INFINITE**	*on "EMPTY" (1-2)*
			0 Ω	*on "FULL" (1-3)*
(PA) - ANTI-FLOODING PRESSURE SWITCH	**D1 ⇔ B2**	⇨	**INFINITE**	*on "EMPTY" (1-2)*
			0 Ω	*on "FULL" (1-3)*
(IP) - DOOR MICROSWITCH	**C1 ⇔ C3**	⇨	**0 Ω**	*Door closed*
(DD/DB) - INTEGRATED DISPENSER	**E1 ⇔ E3**	⇨	**1.500 Ω** ± 8%	*OK*
(SB) - RINSE-AID SENSOR	**G3 ⇔ G4**	⇨	**INFINITE**	*with Rinse-aid*
			0 Ω	*without Rinse-aid*
(SS) - SALT SENSOR	**G1 ⇔ G2**	⇨	**INFINITE**	*with salt*
			0 Ω	*without salt*
(ST) - TEMPERATURE SENSOR	**H1 ⇔ H3**	⇨	**4850 Ω** ± 5%	*(a 25ºC)*
			1205 Ω ± 5%	*(a 60ºC)*
(ER) - REGENERATION SOLENOID	**C1 ⇔ D9**	⇨	**6 KΩ** ± 8%	*OK*
(EC) - FILL SOLENOID **+** (AA) - ANTI-FLOODING DEVICE	**D7 ⇔ D11**	⇨	**3.800 Ω** ± 8%	*connected in series*
(PL) - WASH MOTOR	**D3 ⇔ D11**	⇨	**50 Ω** ± 8%	*start-up winding*
	To the 2 motor wires (bl) / (ro)	⇨	**180 Ω** ± 8%	*auxiliary winding*
(PS) - DRAIN MOTOR	**D1 ⇔ C1**	⇨	**180 Ω** ± 8%	*OK*

16 QUICK GUIDE TO THE SPECIAL FUNCTIONS

The table below briefly describes how each of the special functions available to the user and to the Service Engineer can be used. To activate the user mode, the selector must be turned clockwise; to activate the Service mode, the selector must be turned anti-clockwise.

	Function	Activation of the function				Starting the function				Short description / Notes
	⇩	Button		Selector position		Selector and/or Buttons		LED(s)		⇩
USER (*)	Select Regeneration	**S1** (Start) and hold down	➔	**Pos. 1** clockwise LD0+LD1 flashing (release S1)	➔	**S1**	➔	**LD5** flashing	➔	Level ……. .. .. L1 … … … … ... L2 … … … … … … ... L10 No of flashes End of cycle LED … **1** … … … … **2** … … … … … … … **10** ex. level 3: 3 flashes, pause …. repeatable] x 1min.
SERVICE	Display of alarms and components diagnostic		➔	**Pos. 5** anti-clockwise LD0+LD1 flashing (release S1)	➔	**S1**	➔	**LD5** flashing	➔	The End of cycle LED flashes. The last 3 alarms are displayed pressing button ☞ **S1** repeatedly. From the fourth to the tenth actuation the single components are activated.
	Cancel alarms stored in memory				➔	**Pos. 4** and press **S1**	➔	**All LEDs** flashing	➔	All LEDs flash for 30 seconds.
	Test cycle				➔	**Pos. 3** and press **S1**	➔	**LD5** flashing	➔	The cycle starts automatically signalling the various phases in progress with the lighting of the relative LEDs.
	Exit / Memorize	In order to memorize the functions or exit diagnostics mode, switch the appliance off turning the knob to On/Off position. In most cases the memorization or the exit is automatic after 60 seconds (in this case the appliance goes to pre-selection mode).								

(*) *To activate the "user" functions no cycle has to be selected: to cancel them see 5.2.1; the appliance must be in pre-selection mode.*